Claims

1. A method for preparing a donor cell, tissue, or organ for transplantation into a recipient, said method comprising reducing intracellular lipid storage material of said cell, tissue, or organ.

2. The method of claim 1, wherein a donor cell is prepared.

3. The method of claim 1, wherein a donor tissue is prepared.

4. The method of claim 1, wherein a donor organ is prepared.

5. The method of claim 1, wherein said cell is a liver cell, said tissue is a liver tissue, or said organ is a liver.

6. The method of claim 1, wherein said method comprises contacting said cell, tissue, or organ with a solution that increases oxidation of a lipid; increases export of a lipid from said cell, tissue, or organ; or both.

7. The method of claim 1, wherein said intracellular lipid storage material is a triglyceride, a cholesterol, a cholesterol ester, or a phospholipid.

8. The method of claim 1, wherein said method results in reducing an ischemia-reperfusion injury in said cell, tissue, or organ upon transplantation into a recipient.

9. The method of claim 1, wherein said method results in reducing a cold-preservation-related injury in said cell, tissue, or organ upon transplantation into a recipient.

10. The method of claim 1, wherein said method reconditions a steatotic cell, tissue, or organ.

11. The method of claim 10, wherein said steatotic cell is a liver cell, said steatotic tissue is liver tissue, or said steatotic organ is a liver.

12. The method of claim 1, further comprising inducing heat shock of said cell, tissue, or organ.

13. The method of claim 12, wherein said inducing is the result of increasing the temperature of said cell, tissue, or organ by at least 1^0C for at least one minute.

14. The method of claim 13, wherein said temperature is increased for a period ranging between one minute and one hour.

15. The method of claim 14, wherein said temperature is increased for a period ranging between 1 minute and 30 minutes.

16. The method of claim 15, wherein said temperature is increased for a period ranging between 1 minute and 15 minutes.

17. The method of claim 13, wherein said temperature of said cell, tissue, or organ is increased to a range between 37^0C and 50^0C.

18. The method of claim 17, wherein said temperature of said cell, tissue, or organ is increased to a range between 38^0C and 45^0C.

19. The method of claim 18, wherein said temperature of said cell, tissue, or organ is increased to a range between 40^0C and 43^0C.

20. The method of claim 19, wherein said temperature of said cell, tissue, or organ is increased to a range between 42^0C and 43^0C.

21. The method of claim 13, wherein said increasing of said temperature is the result of heating the whole body of the donor of said cell, tissue, or organ.

22. The method of claim 13, wherein said increasing of said temperature is the result of heating a localized area of the donor including said cell, tissue, or organ.

23. The method of claim 21 or 22, wherein said heating is mediated by microwave or ultrasound treatment.

24. The method of claim 22, wherein said heating is mediated by warming the blood percolating said localized area.

25. The method of claim 21 or 22, wherein said increasing of said temperature is the result of heating said cell, tissue, or organ *ex vivo*.

26. The method of claim 12, wherein said inducing is the result of contacting said cell, tissue, or organ with an agent that increases the expression of at least one heat shock protein in said cell, tissue, or organ.

27. The method of claim 26, wherein said agent is cobalt protoporphyrin or geranylgeranylacetone.

28. The method of claim 26, wherein said cell, tissue, or organ is provided with at least one expression vector comprising a nucleic acid sequence encoding a heat shock protein.

29. The method of claim 1, further comprising administering a heat shock protein to said cell, tissue, or organ.

30. The method of claim 28 or 29, wherein said heat shock protein is selected from the group consisting of HSP72, HSP70, HO-1, and HSP90.

31. The method of claim 12, wherein said inducing decreases the proliferation and activation of T cells.

32. The method of claim 31, wherein said T cells are CD4+ T cells.

33. The method of claim 32, wherein said CD4+ T cells produce inflammatory cytokines, activate Kuffpner cells, or recruit neutrophils.

34. The method of claim 12, wherein said inducing decreases the production of inflammatory cytokines.

35. The method of claim 34, wherein said cytokines are selected from the group consisting of IL-12, Il-10, IFN γ, and TNF α.

36. The method of claim 1, 12, 28, or 29, further comprising contacting said cell, tissue, or organ with a composition comprising gadolinium chloride ($GdCl_3$).

37. The method of claim 1, 12, 28, or 29, further comprising contacting said cell, tissue, or organ with a composition comprising an agent that inhibits the proliferation, activation, or both of T cells.

38. The method of claim 37, wherein said agent is selected from the group consisting of cyclosporine A (CyA) and FK506.

39. The method of claim 1, wherein said cell, tissue, or organ is transplanted between 3 to 48 hours after said preparing.

40. The method of claim 39, wherein said cell, tissue, or organ is transplanted between 6 to 48 hours after said preparing.

41. The method of claim 12, wherein said cell, tissue, or organ is transplanted between 6 to 48 hours after said inducing.

42. The method of claim 41, wherein said cell, tissue, or organ is transplanted 24 hours after said inducing.

43. A solution for reducing intracellular lipid storage material of a donor cell, tissue, or organ comprising a catabolic hormone and an amino acid, wherein said catabolic hormone is selected from the group consisting of glucagon, epinephrine, growth hormone, hepatocyte growth factor, leptin, adiponectin, metformin, thyroid hormone, and a glucocorticoid hormone and wherein said amino acid is selected from the group consisting of alanine and glutamine.

44. The solution of claim 43, wherein said catabolic hormone increases intracellular lipid oxidation.

45. The solution of claim 43, wherein said catabolic hormone increases lipid export.

46. The solution of claim 43, wherein said glucocorticoid hormone is a hydrocortisone, a cortisol, a corticosterone, or dexamethasone.

47. The solution of claim 43, wherein said amino acid is required for the synthesis of an apolipoprotein.

48. The solution of claim 43, wherein said solution further comprises an anti-oxidant.

49. The solution of claim 48, wherein said anti-oxidant is N-acetyl-cysteine, glutathione, allopurinol, S-adenosyl-L-methionine, polyphenols, free iron scavengers, adenosine, cyclodextrin, superoxide dismutase (SOD), catalase, chlorpromazine, and prostacyclin, or inhibitors of inducible nitric oxide synthase (iNOS).

50. The solution of claim 48, wherein said anti-oxidant is deferoxamine, N(G)-nitro-L-arginine methyl ester, or aminoguanidine.

51. The solution of claim 43, wherein said solution further comprises an oxygen carrier.

52. The solution of claim 51, wherein said oxygen carrier is hemoglobin or a perfluorocarbon.

53. The solution of claim 43, said solution further comprising a component that provides oncotic pressure.

54. The solution of claim 43, comprising
from 50 mM to 150 mM sodium ion;
from 0.4 mM to 4 mM potassium ion;
from 0 mM to 50 mM phosphate ion;
from 0 mM to 44 mM bicarbonate ion;
from 0.19 mM to 5 mM calcium ion;
from 0.081 mM to 5 mM magnesium ion;
from 0.2 mM to 2.4 mM alanine;
from 0.2 mM to 10 mM glutamine;
from 50 pg/mL to 1000 pg/mL glucagon;
from 100 pg/mL to 2500 pg/mL epinephrine;
from 50 ng/mL to 1500 ng/mL hydrocortisone; and
from 30 g/mL to 120 g/mL hydroxyethyl starch.

55. The solution of claim 54, comprising
116 mM sodium ion;
2.3 mM potassium ion;
1.0 mM sodium phosphate (monobasic);
26 mM sodium bicarbonate;
1.9 mM calcium ion;
0.81 mM magnesium ion;
0.48 mM alanine;
2.00 mM glutamine;
100 pg/mL glucagon;
250 pg/mL epinephrine;
150 ng/mL hydrocortisone; and
60.0 g/mL hydroxyethyl starch.

56. The solution of claim 43, wherein said solution is at a temperature of 25 to 45^{0}C.

57. The solution of claim 43, wherein said solution has been exposed to 20 to 100 % O_2.

58. The solution of claim 43, wherein said solution has been exposed to 0 to 10% CO_2.

59. The solution of claim 43, wherein said solution has a pH of 6.5 to 7.8.

60. The solution of claim 43, wherein said solution has a pH of 7.4.

61. The solution of claim 43, further comprising an agent that increases the expression of at least one heat shock protein in said cell, tissue, or organ.

62. The solution of claim 61, wherein said agent is cobalt protoporphyrin or geranylgeranylacetone.

63. A method for preparing a donor cell, tissue, or organ for transplantation into a recipient, said method comprising contacting said donor cell, tissue, or organ with the solution of claim 43.

64. The method of claim 63, wherein said solution is heated to a temperature of 37^0C.

65. The method of claim 63, wherein said solution is heated to a temperature of 40^0C- 43^0C.

66. The method of claim 63, wherein said solution is exposed to 95% O_2 and 5% CO_2.

67. The method of claim 63, said method comprising contacting said cell, tissue, or organ for at least 10 minutes with said solution.

68. The method of claim 67, said method comprising contacting said cell, tissue, or organ for at least one hour with said solution.

69. The method of claim 68, said method comprising contacting said cell, tissue, or organ for at least six hours with said solution.

70. The method of claim 63, wherein said solution has a pH of 7.4.

71. A method for reconditioning a steatotic cell, tissue, or organ for transplantation into a recipient, said method comprising contacting said cell, tissue, or organ with the solution of claim 43.

72. A method for reconditioning a steatotic cell, tissue, or organ for transplantation into a recipient, said method comprising contacting said cell, tissue, or organ with the method of claim 1.

73. A method of storing a donor cell, tissue, or organ for transplantation into a recipient, said method comprising contacting said donor cell, tissue, or organ with the solution of claim 43.

74. A method of storing a donor cell, tissue, or organ for transplantation into a recipient, said method comprising contacting said donor cell, tissue, or organ with the method of claim 1.

75. A kit for preparing a donor cell, tissue, or organ for transplantation into a recipient, said kit comprising a solution for reducing intracellular lipid storage material of said donor cell, tissue, or organ and instructions for using said solution for preparing a donor cell, tissue, or organ for transplantation into a recipient.

76. The kit of claim 75, said kit comprising the solution of claim 43.

77. A kit for reconditioning a steatotic cell, tissue, or organ for transplantation into a recipient, said kit comprising a solution for reducing intracellular lipid storage of said steatotic cell, tissue, or organ and instructions for using said solution for reconditioning said steatotic cell, tissue, or organ for transplantation into a recipient.

78. The kit of claim 77, said kit comprising the solution of claim 43.

79. A kit for storing a donor cell, tissue, or organ for transplantation into a recipient, said kit comprising a solution for reducing intracellular lipid storage material in said donor cell, tissue, or organ and instructions for using said solution for storing a donor cell, tissue, or organ for transplantation into a recipient.

80. The kit of claim 79, said kit comprising the solution of claim 43.

81. A cell, tissue, or organ prepared according to the method of any one of claims 1, 12, 28, 29, 63, or 71-74.

82. An isolated defatted donor cell, tissue, or organ.

83. The isolated cell, tissue, or organ of claim 82, wherein said cell, tissue, or organ is prepared for transplantation into a recipient.

84. The isolated cell, tissue, or organ of claim 82, wherein a defatted cell is prepared.

85. The isolated cell, tissue, or organ of claim 82, wherein a defatted tissue is prepared.

86. The isolated cell, tissue, or organ of claim 82, wherein a defatted organ is prepared.

87. The isolated cell, tissue, or organ of claim 82, wherein said cell, tissue, or organ has been heat shocked.